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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANDREW L. VAN BROCKLIN and ERIC MARTIN

Appeal 2008-4353[1]
Application 10/782,488
Technology Center 2800

Decided: December 30, 2008

Before JOHN C. MARTIN, JOESPH F. RUGGIERO, and
SCOTT R. BOALICK, *Administrative Patent Judges.*

MARTIN*, Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1, 2, 18, and 31. Final Action 3. Inasmuch as claims 1

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[1] Filed February 18, 2004.

and 2 have been canceled by an after-final Amendment[2] that the Examiner has approved for entry,[3] the appeal is hereby dismissed as to those claims.

We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

A. Appellants' invention

Appellants' invention relates to the calibration of diffractive light devices (DLDs), which produce colors based on the precise spacing of a pixel plate relative to lower (and possibly upper) plates. Specification at [0003].

Appellants' Figures 1 and 2 are reproduced below.

[2] "After-Final Response Under 37 C.F.R § 1.116," dated September 6, 2006.

[3] Answer 2.

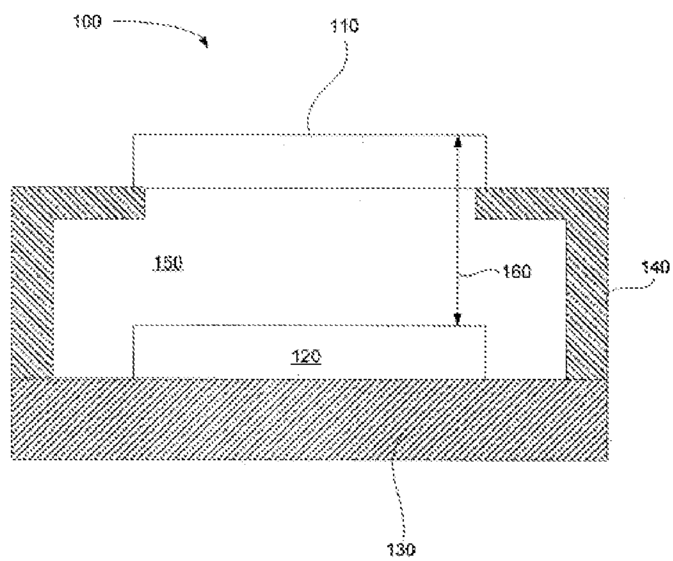

Fig. 1

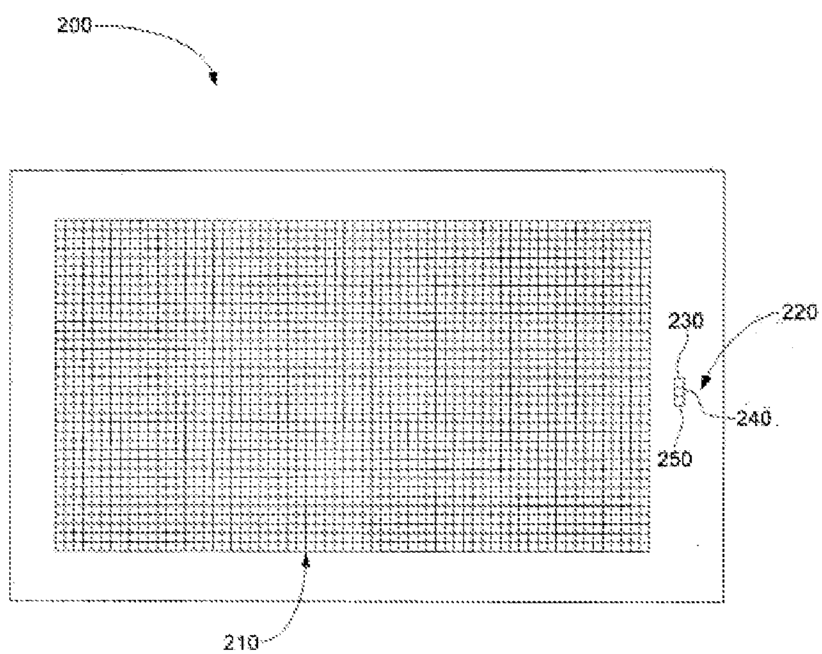

Fig. 2

Figure 1 illustrates a diffractive light device (DLD) according to one exemplary embodiment. *Id*. at [0005]. Fig. 2 illustrates a DLD die (200) which generally includes a human visible array (210) and a calibration array (220). *Id*. at [0018].

The spacing between the plates is the result of a balance of two forces: electro-static attraction based on voltage and charge on the plates; and a spring constant of one or more support structures maintaining the position of the pixel plate away from the electrostatically charged plate. *Id*. at [0003]. However, the spacing can also undesirably affected by other factors, such as a change in the operating temperature. *Id*. Appellants' invention calibrates a DLD to avoid such undesirable effects by calculating and applying corrected operating voltages. *Id*. at [0003].

Specifically, the invention employs a feedback-control circuit that includes at least one sensor configured to convert light modulated by the DLD device into a light signal indicative of the gap and further includes a controller for calculating a voltage correction value based on a difference between the gap as indicated by the light signal and a designer-specified gap value. *Id*.

Figure 3 is reproduced below.

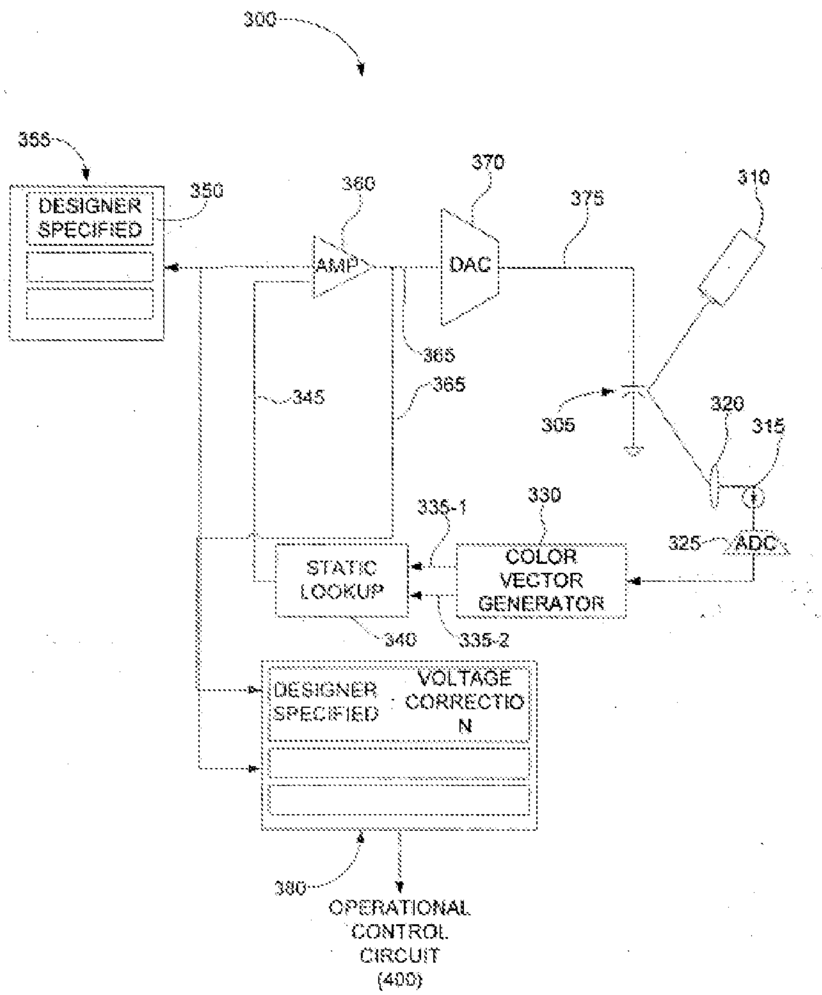

Fig. 3

Figure 3 illustrates a calibration feedback-control circuit according to one exemplary embodiment. *Id.* at [0007].

A light source, such as a projector lamp (310), illuminates the DLD device (305). *Id.* at [0022]. While for ease of illustration a single DLD device is shown (305), any number of DLD devices may be used. *Id.* For

example, in Fig. 2 three DLD devices are used, representing red, green, and blue pixels. *Id*.

Light diffracted by the DLD device (305) illuminates a photodiode (315). *Id*. at [0023].[4] The output signal generated by photodiode (315) is processed by an analog to digital converter (ADC) (325), a color-vector generator (330), and a static lookup table (340) to generate the "assumed gap value" (i.e., the calculated actual gap value) (345). *Id*. at [0024-25].

Each assumed gap value (345) is then compared to a corresponding designer-specified or intended gap value (350), which resides on a specification lookup table (355). *Id*. at [0026]. The assumed gap value (345) and the designer-specified gap value (350) are passed through an amplifier (360) that amplifies the difference by some amplification constant, K. *Id*. This difference, which may be referred to as the voltage-correction value (365), is used to correct the actual gap distance (160, Fig. 1) of the DLD device (305) of the calibration feedback-control circuit (300) and to update the color produced by a human visible array. *Id*. at [0026].

To correct the wavelength of light diffracted by the DLD device (305) of the calibration feedback-control circuit (300), the corrected voltage value is passed through a digital-to-analog converter (DAC) (370), which uses the digital signal of the corrected voltage value to determine a corrected voltage

[4] The light is also described as being "modulated" by the DLD device. *Id*. at [0041].

(375). *Id.* at [0027]. The DAC (370) may be coupled to or include a variable voltage source configured to drive the corrected voltage (375) onto the DLD device (305). *Id.*

Figure 4, not reproduced below, is a block diagram of an operational control circuit (400), which includes DLD circuitry (410) that provides a number of color-voltage gap values to be summed with corresponding corrected voltage values. *Id.* at [0033].

B. The claims

Claims 18 and 31 read as follows:

> 18. A method of calibrating a diffractive light device (DLD), comprising:
>
> placing first and second opposing plates in a separated position defined by an actual gap distance;
>
> directing light onto said DLD device to modulate that light;
>
> converting modulated light to an assumed gap value;
>
> comparing said assumed gap value to a designer-specified gap value; and
>
> adjusting said assumed [*sic*: said actual] gap distance by a distance proportional to a difference between said assumed gap value and said designer-specified gap value.
>
> 31. A DLD system, comprising:
>
> means for diffracting light based on an actual gap distance;

> means for converting detected light values to assumed gap values;
>
> means for comparing said assumed gap values to designer-specified gap values; and
>
> means for adjusting said actual gap distance to minimize the distance [*sic*: difference] between said assumed gap values and said designer-specified gap values.

C. The reference and rejection

Claims 18 and 31 stand rejected under 35 U.S.C. § 102(a) for anticipation by the following U.S. patent:

Tucker et al. (Tucker)	US 6,538,748 B1	Mar. 25, 2003

THE ISSUES

Appellants have the burden on appeal to the Board to point out the errors in the Examiner's position. *See Gechter v. Davidson*, 116 F.3d 1454, 1460 (Fed. Cir. 1997) ("[W]e expect that the Board's anticipation analysis be conducted on a limitation by limitation basis, with specific fact findings for each *contested* limitation and satisfactory explanations for such findings.") (emphasis added).

The issues are: (1) whether Appellants have shown that Tucker fails to disclose the steps of claim 18 of "converting modulated light to an assumed gap value" and "comparing said assumed gap value to a designer-specified gap value"; and (2) whether Appellants have shown that Tucker fails to

disclose the corresponding limitations in claim 31.

PRINCIPLES OF LAW

"To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

ANALYSIS

Tucker discloses a tunable optical cavity (Tucker, col. 2, ll. 21) in which thermally induced vibrations are reduced by utilizing an electrical feedback circuit that measures the distance between the mirrors. *Id.*, col. 2, ll. 34-37.

The Examiner (Answer 3-4) reads claim 18 on the embodiment depicted in Figure 8, reproduced below.

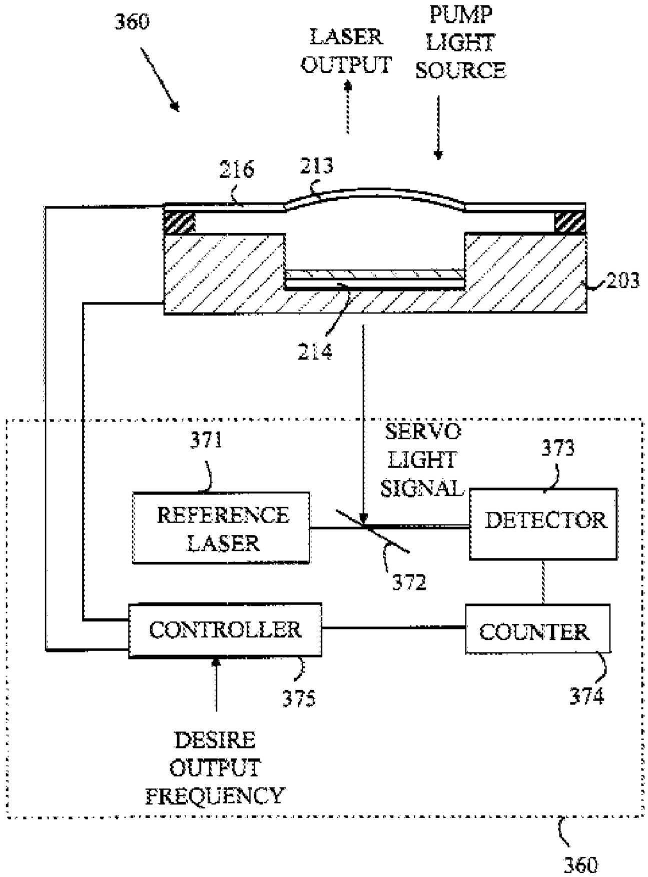

FIGURE 8

Figure 8 shows a laser feedback circuit 360 for controlling the tuning voltage on a tunable laser (also 360[5]), such as the laser shown in Figure 7 (*id.*, col. 5, ll. 50-54), which employs a Fabry-Perot filter. *Id.*, col. 5, ll. 31-33. The voltage between the support membrane and the substrate is adjusted

[5] The numeral 360 that is associated with the laser should instead read "350," as shown in Figure 7 and described at column 5, lines 50-54.

by comparing the output of the laser to that of a reference laser. *Id.*, col. 5, ll. 47-50.

Substrate 203 is transparent so that servo light signal can be taken through the substrate without disturbing the laser output light that leaves via mirror 213. *Id.*, col. 5, ll. 54-57. The comparison can be performed by any method that allows the controller 375 to determine the difference in wavelength between the reference laser and the tunable laser. *Id.*, col. 5, l. 59 to col. 6, l. 3. For example, the light beams generated by the two lasers can be mixed using a partially reflecting mirror 372 and a detector 373 to generate a signal whose beat frequency is counted by a counter 374. *Id.*, col. 6, ll. 3-7. Controller 375 then adjusts the potential between membrane 216 and substrate 203. *Id.*, col. 6, ll. 7-8.

Appellants do not deny that the recited steps of claim 18 of "placing first and second opposing plates in a separated position defined by an actual gap distance" and "directing light onto said DLD device to modulate that light" read on Tucker's Figure 8 embodiment or that Tucker's "servo light signal" corresponds to the "modulated light" in the step of "converting modulated light to an assumed gap value."

Instead, Appellants argue that the Examiner erred in finding that Tucker discloses the steps of "converting modulated light to an assumed gap value" and "comparing said assumed gap value to a designer-specified gap value." Answer 3-7. Specifically, the Examiner found that the recited "assumed gap value" and "designer-specified gap value" read on the

wavelengths of the servo light signal and the reference laser, respectively, because "[t]here is a direct relation between the wavelength of the light produced by a Fabry-Perot etalon and the spacing (i.e. gap) between the plates of the etalon. If the wavelength of the light produced by the etalon is known, the spacing can be found, and vice versa." *Id.* at 6. As support, the Examiner provided the following equation, which is said to apply to a Fabry-Perot etalon:

$$m\lambda = 2dn$$

wherein m is a integer number, λ is the wavelength of the light produced by the etalon due to modulation, d is the spacing between the reflective plates of the etalon, and n is the refractive index of the material in the spacing between the reflective plates of the etalon. *Id.*

Appellants concede the correctness of the Examiner's description of the relationship between frequency and plate spacing (Reply Br. 3) but argue that the Examiner's reliance on that relationship is improper because neither that relationship nor the equation cited by the Examiner as support are disclosed in Tucker. This argument is unconvincing because it is permissible for an anticipation rejection to be based on inherency, *Schreiber*, 128 F.3d at 1477, and to be based on additional references that demonstrate such inherency. *See In re Samour*, 571 F.2d 559, 562 (CCPA 1978) (PTO, in making a rejection under 35 U.S.C. § 102(b) based on a single prior art reference that discloses every material element of the claimed subject matter, can properly rely on additional references for such purpose).

Regarding the Examiner's further finding that "light modulated by a Fabry-Perot etalon is converted into an assumed gap *value* because the wavelength *value* of the modulated light is used to calculate the spacing of the etalon, which is an assumed gap *value*" (Answer 6), Appellants argue that "Tucker does not teach or suggest that a wavelength value is measured or quantified" (Reply Br. 4), which argument we understand to mean that Tucker fails to disclose converting the servo light signal into a gap value, as is necessary to satisfy the step of "converting modulated light into an assumed gap value." According to Appellants,

> Tucker teaches detecting beats between the frequencies of two light sources (a servo light signal and a reference laser) and counts the beats between the frequencies. This beat count provides a direct comparison of the frequencies of the two light sources, without the need to every assign a numerical value to either of the frequencies, from which an assumed gap value could be calculated.

Id. We agree with Appellants. Although the claimed "assumed gap value" *can* be calculated from the frequency of the servo light signal, Tucker does not disclose making such a calculation, let alone comparing the results of such a calculation to a designer-specified gap value.

Appellants have therefore shown that the Examiner erred in finding that Tucker discloses the recited steps in claim 18 of "converting modulated light to an assumed gap value" and "comparing said assumed gap value to a designer-specified gap value." For the same reasons, Appellants have also shown that the Examiner erred in finding that Tucker discloses the "means

for converting detected light values to assumed gap values" and "means for comparing said assumed gap values to designer-specified gap values" recited in claim 31.

DECISION

The rejection of claims 18 and 31 for anticipation by Tucker is reversed.

REVERSED

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